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ORIGINAL

TECHNICAL MANUAL

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OPERATOR'S, ORGANIZATIONAL,
DIRECT SUPPORT
AND
GENERAL SUPPORT MAINTENANCE MANUAL

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FOR

MULTIPLIER, ELECTRICAL INSTRUMENT TS-265A/UP

(NSN 6625-00-242-7544)

HEADQUARTERS, DEPARTMENT OF THE ARMY
10 SEPTEMBER 1985

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Mlb

5 SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

1. DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL

2. IF POSSIBLE, TURN OFF THE ELECTRICAL POWER

3. IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH, OR LIFT THE PERSON TO SAFETY USING A WOODEN POLE OR ROPE OR SOME OTHER INSULATING MATERIAL

4. SEND FOR HELP AS SOON AS POSSIBLE

5. AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION

NOTE: DON'T WAIT UNTIL AN ACCIDENT HAPPENS ! READ ABOUT ARTIFICIAL RESPIRATION IN FM21-11.

A

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WARNING

DANGEROUS HIGH VOLTAGES ARE USED IN THE OPERATION OF THIS EQUIPMENT

Be extremely careful and take the following precautions before coming in contact with the Multiplier.

Make certain that power is off. With test lead, short to ground both input terminals of the Multiplier.

DON'T TAKE CHANCES!

EXTREMELY DANGEROUS VOLTAGES MAY EXIST AT THE FOLLOWING LOCATIONS:

J100 ..... up to 500 volts ac.

J101 ..... up to 500 volts ac.

J102 ..... up to 5,000 volts ac.

J103 ..... up to 50,000 volts ac.

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TECHNICAL MANUAL

No. 11-6625-3042-14

HEADQUARTERS,
DEPARTMENT OF THE ARMY
Washington, DC, 6 September 1985

OPERATOR'S ORGANIZATIONAL, DIRECT SUPPORT

AND

GENERAL SUPPORT MAINTENANCE MANUAL

MULTIPLIER, ELECTRICAL INSTRUMENT TS-265A/UP

(NSN 6625-00-242-7544)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-ME-MP, Fort Monmouth, New Jersey 07703-5007. In either case, a reply will be furnished direct to you.

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CHAPTER 1

GENERAL INFORMATION

Section I. INSTRUCTIONS

1–1. SCOPE.

This manual contains instructions for the operations and maintenance of Multiplier, Electrical Instrument TS-265A/UP and its accessories. Throughout this manual the Multiplier, Electrical Instrument TS-265A/UP is referred to as the Multiplier.

1–2. CONSOLIDATED INDEX OF ARMY PUBLICATIONS AND BLANK FORMS.

Refer to the latest issue of DA Pam 310-1 to determine whether there are new additions, changes, or additional publications pertaining to this equipment.

1–3. MAINTENANCE FORMS, RECORDS, AND REPORTS.

a. Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750 as contained in Maintenance Management Update.

b. Report of Packaging and Handling Deficiencies. Fill out and forward SF 364 (Report of Discrepancy (ROD) as prescribed in AR 735-11-2/DLAR 4140.55/NAVMATINST 4355.73A/AFR 400-54/MCO 4430.3F.

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33C/AFR 75-18/MCO P4610.19D/DLAR 4500.15.

1–4. REPORTING OF EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR).

If your Multiplier, TS-265A/UP needs improvement, let us know. Send us an EIR. You the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on SF 368 (Quality Deficiency Report). Mail it to Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-PA-QP, Fort Monmouth, New Jersey 07703-5007. We'll send you a reply.

1–5. ADMINISTRATIVE STORAGE.

Administrative storage of equipment issued to and used by Army activities will

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have preventative maintenance performed in accordance with PMCS charts before storing. When removing the equipment from administrative storage the PMCS should be performed to assure operational readiness.

1–6. DESTRUCTION OF ARMY ELECTRONICS MATERIEL.

Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

Section II. DESCRIPTION AND DATA

1–7. INTRODUCTION.

This manual describes Multiplier, Electrical Instrument TS-265A/UP and its accessories (fig. 1-1), and covers operation and maintenance. The manual contains five chapters: GENERAL INFORMATION, OPERATING INSTRUCTIONS, GENERAL THEORY, OPERATOR AND ORGANIZATIONAL MAINTENANCE, DIRECT AND GENERAL SUPPORT MAINTENANCE.

1–8. PURPOSE AND USE.

Multiplier, Electrical Instrument TS-265A/UP is a portable, general purpose test unit. The multiplier is designed to step down high ac voltages by a known ratio of either 10:1 or 100:1, enabling the outputs to be observed on a standard oscilloscope.

1–9. TECHNICAL CHARACTERISTICS.

For a listing of technical characteristics pertaining to Multiplier, Electrical Instrument TS-265A/UP, refer to table 1-1.

1–10. EQUIPMENT, ACCESSORIES, AND DOCUMENTS SUPPLIED.

For a listing of equipment, accessories, and documents supplied pertaining to Multiplier, Electrical Instrument TS-265A/UP, refer to table 1-2.

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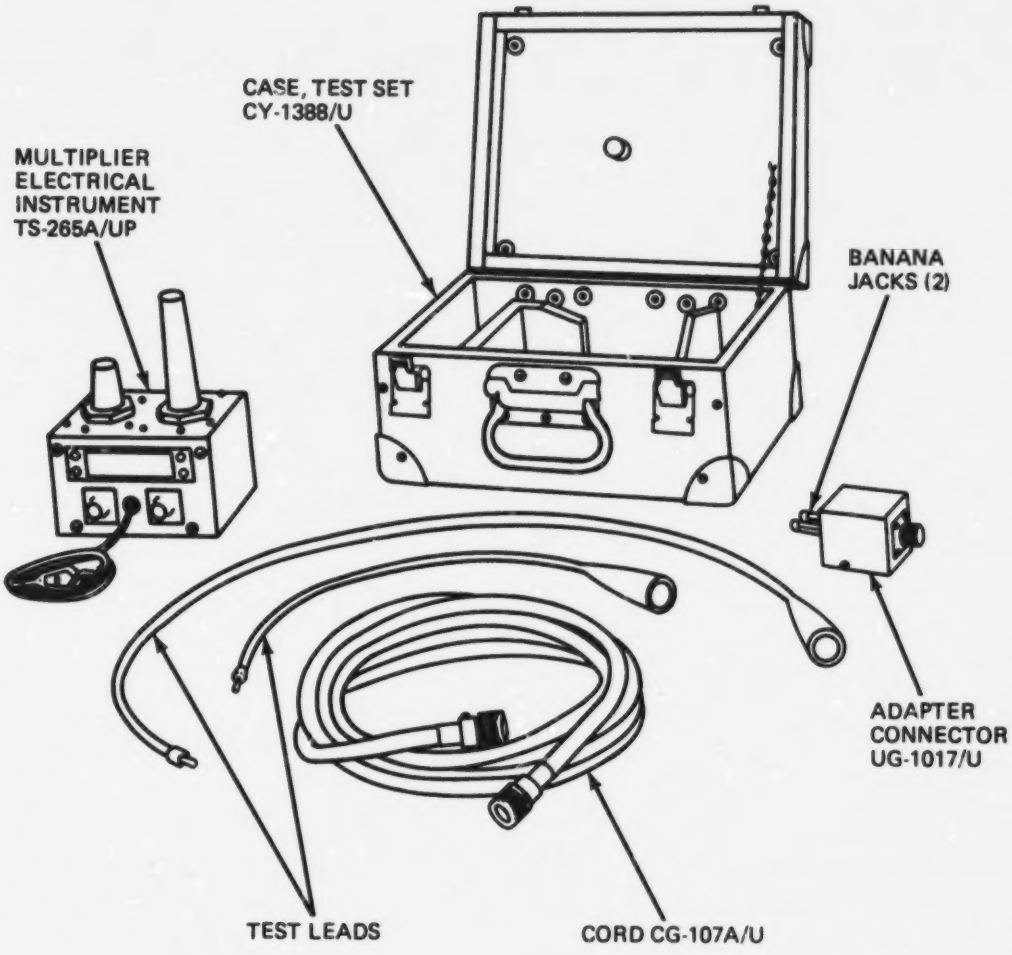

Figure 1-1. Multiplier, Electrical Instrument TS-265A/UP and Accessories

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Table 1-1. Technical Characteristics

Characteristic	Definition
AC Voltage-Dividing Ratios	10:1 ratio section ±5% 100:1 ratio section ±5%
AC Voltage Maximum Inputs 10:1 ratio section 100:1 ratio section	 5 kV, peak-to-peak 50 kV, peak-to-peak
Overall Dimensions	6-3/4 in. H x 4-3/4 in. D x 5-3/8 in. W
Weight	2.1 pounds
Low Temperature	-4° F operating, -65° F storage
High Temperature	125° F operating, 160° F storage

Table 1-2. Equipment, Accessories, and Documents Supplied

Quantity	Item	Height (in.)	Depth (in.)	Width (in.)	Unit weight (lb.)
1	Multiplier, Electrical Instrument TS-265A/UP	6-3/4	4-3/4	5-3/8	2.1
1	Case, Test Set CY-1388/U	6-1/4	8-1/2	11-1/4	6.5
1	Adapter, Connector UG-1017/U	1-5/8	1-7/8	3-1/2	0.5
1	Cord CG-107A/U (10 ft).				0.5
1	Test Lead SC-DL-24915 (18 in.)				0.5
1	Test Lead SC-DL-24915 (36 in.)				0.5
1	TM 11-6625-3042-14				

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CHAPTER 2

OPERATING INSTRUCTIONS

2–1. INTRODUCTION.

This chapter contains the preliminary starting procedure, starting and operating procedure, and the stopping procedure for Multiplier, Electrical Instrument TS-265A/UP.

2–2. PRELIMINARY STARTING PROCEDURES.

NOTE

The following procedure is used to determine safe operating conditions with regard to maximum voltages and input jacks. Refer to fig. 2-1 and table 2-1 during operation of the Multiplier.

a. Determine the approximate ac peak-to-peak voltage to be measured.

b. If the input voltage to be measured exceeds 5 kilovolts (kV) peak-to-peak, use input jack J103 (fig. 2-1 and table 2-1) marked RATIO 100:1; otherwise use either jack J103 RATIO 100:1 or jack J102, RATIO 10:1.

c. Never apply voltage higher than 50 kV peak-to-peak to the input jack RATIO 100:1. Never apply voltage higher than 5 kV peak-to-peak to the input jack RATIO 10:1.

d. Turn off the power on the equipment to be measured.

WARNING

Before making any connection to the equipment under test, make sure that the power is off and that the high-voltage capacitors in the Multiplier are discharged.

e. Short input jacks J102 and J103 to ground through the external connector (battery clip) on test lead SC-C-24915 and the ground cable on the Multiplier. This provides a discharge path for the high-voltage capacitors.

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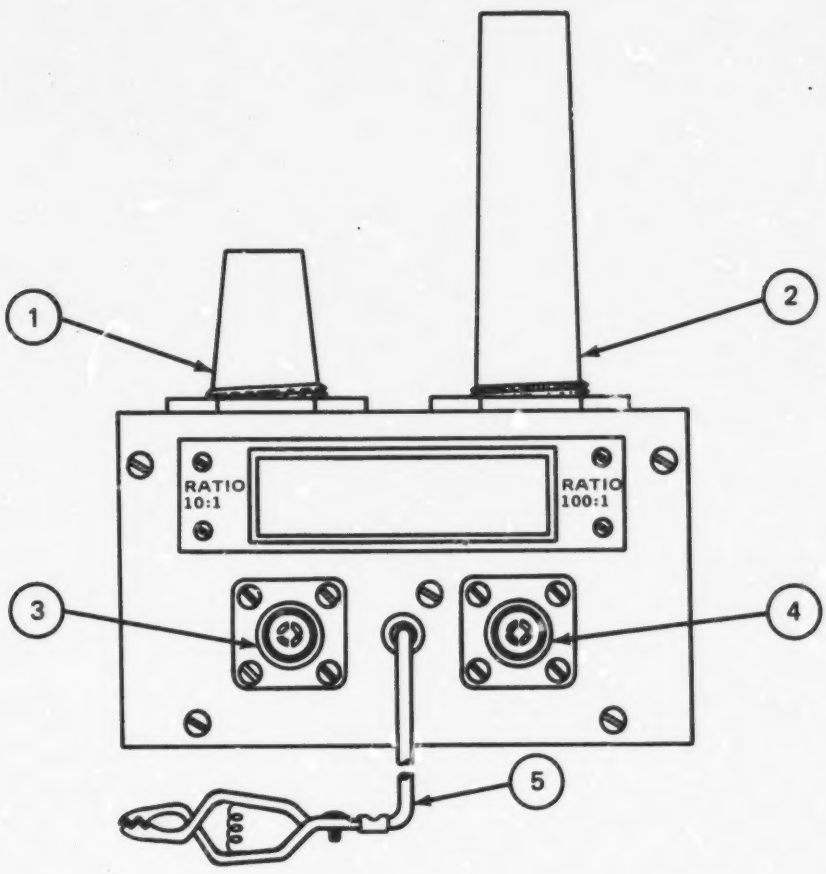

Figure 2-1. Multiplier, Electrical Instrument TS-265A/UP, Connections

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Table 2-1. Multiplier, Electrical Instrument TS-265A/UP Connections

Figure 2-1 legend No.	Connection	Function
1	RATIO 10:1 INPUT jack J102.	Provides the input receptacle for high-voltage test lead. Used in conjunction with output receptacle RATIO 10:1.
2	RATIO 100:1 INPUT jack J103.	Provides the input receptacle for high-voltage test lead. Used in conjunction with output receptacle RATIO 100:1.
3	Coaxial connector RATIO 10:1 output J100.	Provides the output receptacle for coaxial output cable.
4	Coaxial connector RATIO 100:1 output J101.	Provides the output receptacle for coaxial output cable.
5	Ground lead.	Provides the ground connection for the input and output of the Multiplier, and provides a discharge path to enable the operator to discharge the capacitors of the Multiplier.

2–3. STARTING AND OPERATING PROCEDURES.

The following procedure provides instructions for connecting the Multiplier to the test equipment and to the equipment under test.

a. Connect the ground lead (fig. 2-2) extending from the Multiplier to the ground terminal of the equipment to be tested.

b. Connect the coaxial cable to the coaxial output connector marked RATIO 100:1 (fig. 2-2) to measure a maximum 50-kV input, or to the connector marked RATIO 10:1 (fig. 2-3) a maximum 5-kV input.

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c. Connect the other end of the coaxial cable to the corresponding indicating instrument (oscilloscope). If the indicating instrument is not provided with a coaxial cable connector, terminate the coaxial cable into Connector Adapter UG-1017/U (fig. 1-1) supplied with the Multiplier. Connect both banana jacks on the adapter to the corresponding terminals of the indicating instrument. (Fig. 2-2). Make sure that the banana jack marked GD is connected to the ground terminal of the indicating instrument.

d. Insert the test lead (36-inch) plug into jack J103 marked RATIO 100:1 to measure a 50-kV input (or less), or insert the test lead (18-inch) plug into jack J102 marked RATIO 10:1 to measure a 5-kV input (or less).

e. Clip the other end of the high-voltage test lead to the high-voltage terminal on the equipment to be measured.

f. Check all cable connections for good contacts.

NOTE

Make sure the ground leads are connected between the voltage divider and the equipment under test and also between the adapter and the oscilloscope.

g. Turn on the equipment to be measured.

h. Proceed with the measurements or observations.

2-4. STOPPING PROCEDURE.

The following procedure provides instructions for turning off and disconnecting the Multiplier.

a. Turn off the equipment being measured.

b. Discharge the high-voltage capacitors by disconnecting test lead battery clip and shorting to the Multiplier ground cable.

c. Disconnect the coaxial cable.

d. Disconnect the test lead from Multiplier.

e. Disconnect the ground lead from the ground terminal.

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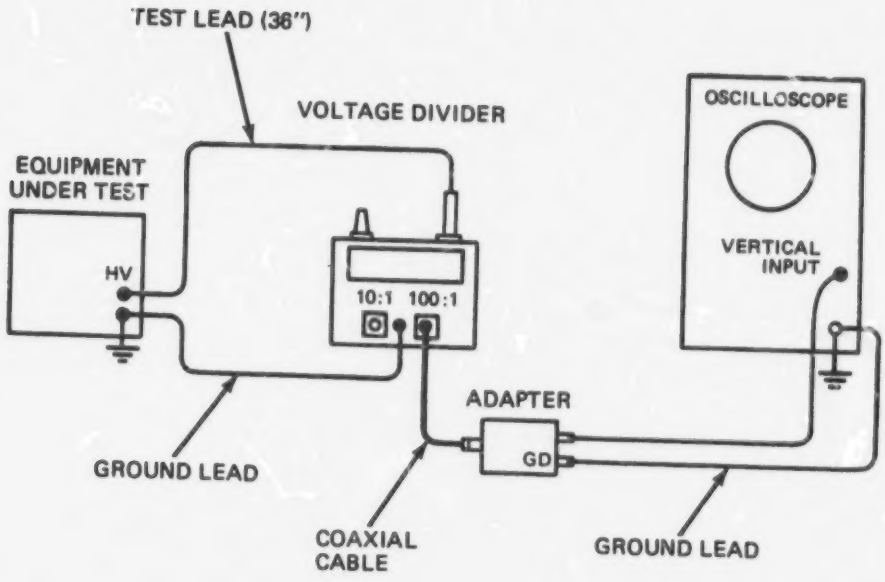

Figure 2-2. Equipment Test Setup, Ratio 100:1

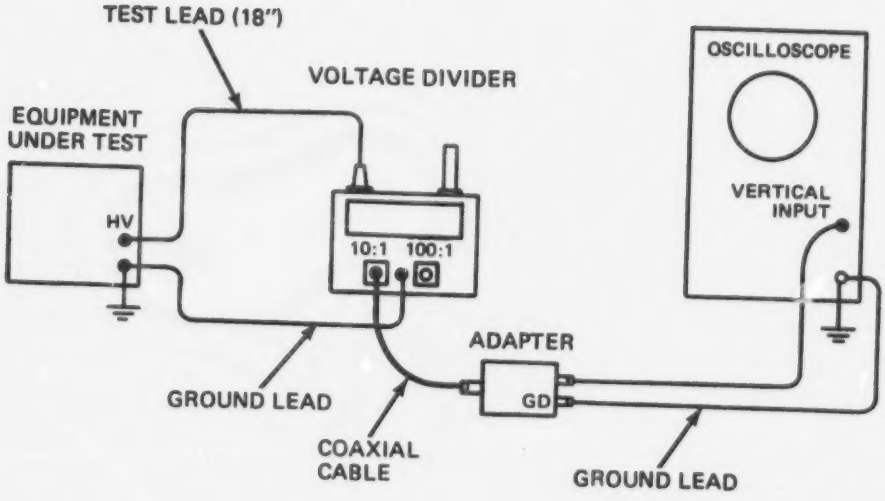

Figure 2-3. Equipment Test Setup, Ratio 10:1

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CHAPTER 3

GENERAL THEORY

3–1. THEORY OF OPERATION.

The Multiplier, Electrical Instrument TS-265A/UP (fig. 3-1) is a capacitive-type voltage divider; therefore, it is useful only for ac voltage measurements or observations. It is based on the theory that when an ac voltage is applied across two or more capacitors connected in series, the voltage applied will be divided so that the voltage drop across an individual capacitor will be inversely proportional to the capacitance value of each capacitor. Consequently, the ac voltage drops across the capacitors can be adjusted for any suitable ratio by proper selection of the capacitor values. The Multiplier consists of two independent and separate voltage divider sections. One section is provided for a voltage-dividing ratio of 100:1, and the other is provided for a voltage-dividing ratio of 10:1. The 100:1 voltage divider section consists of fixed capacitors C104 and C106, and trimmer capacitor C105 which is used to provide the adjustment for the proper dividing ratio. The input voltage is applied to the voltage divider through the test lead connected into jack J103, which also serves as capacitor C104. The flexible ground lead is provided for the ground return. When the output coaxial cable is inserted in coaxial connector J101, the capacitance ratio is such as to provide one-hundredth of the input voltage. The 10:1 voltage divider section consists of fixed capacitors C100, C101, and C103, and trimmer capacitor C102. Trimmer capacitor C102 is used to provide the adjustment for the proper dividing ratio. The input voltage is applied to the voltage divider through the test lead connected into jack J102. When the coaxial cable is inserted into coaxial connector J100, the capacitance ratio is such as to provide one-tenth of the input voltage.

3–2. CIRCUIT DESCRIPTION.

When the Multiplier is used for 100:1 dividing ratio, the signal is picked up by the test lead and is fed to the 100:1 section of the voltage divider through input jack J103. At J103, the voltage is applied across the series-parallel combination of capacitors C104, C105, and C106. The voltage across the parallel combination of capacitors C105 and C106 will be only one-hundredth of the voltage applied to J103. The remainder of the voltage applied will be across capacitor C104. The reduced output is available through impedance matching resistor R101 in the corresponding 100:1 coaxial cable connector J101. When the Multiplier is used for 10:1 dividing ratio, the signal is picked up by the test lead and fed to the 10:1 section of the voltage divider through input jack J102. At J102, the voltage is applied across the series-parallel combination of capacitors C100, C101, C102, and C103. The voltage across the parallel combination

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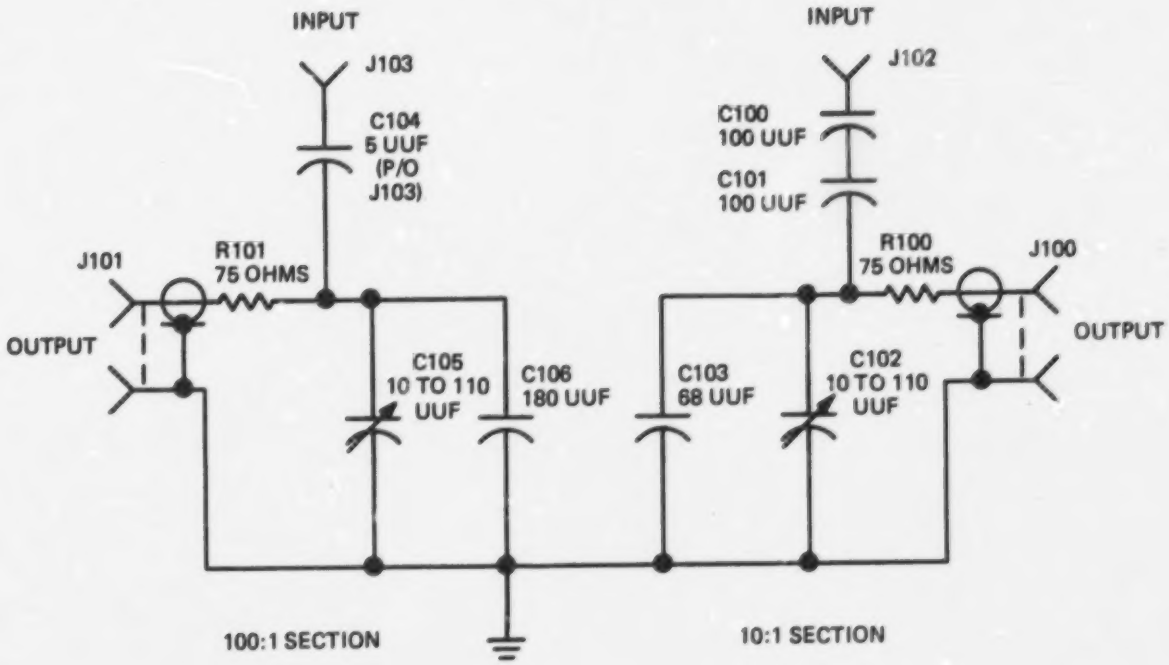

Figure 3-1. Multiplier, Electrical Instrument TS-265A/UP, Schematic Diagram

of capacitors C102 and C103 will be one-tenth of the voltage applied to J102. The remainder of the voltage applied will be across the series combination of capacitors C100 and C101. The reduced output is available through impedance matching resistor R100 in the corresponding 10:1 coaxial cable connector J100. A coaxial cable is furnished for both the 100:1 and 10:1 output jacks to connect the Multiplier to an indicating device. The adapter (fig. 1-1) is used to furnish a straight-through connection from the coaxial output cable to indicating devices that are not equipped with coaxial connectors.

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CHAPTER 4

OPERATOR AND ORGANIZATIONAL MAINTENANCE

Section I. GENERAL

4–1. SCOPE.

At this maintenance level, maintenance is external only, consisting of visual inspection, cleaning, and operational checks.

WARNING

Before proceeding with any of the following procedures or checks, make certain that all power is removed and that high-voltage capacitors are discharged.

4–2. ROUTINE MAINTENANCE PROCEDURE.

a. Use a clean cloth to remove dust, dirt, moisture, and grease from the Multiplier and case. If necessary, use a soft cotton cloth dampened with a mild solution of detergent and water and then wipe the part with a dry clean cloth.

b. Check to see that all panel and chassis screws are tight.

c. When the finish on the Multiplier has been scarred or damaged badly, touch up the bare surfaces to prevent corrosion. Use No. 000 sandpaper to clean the surface down to the bare aluminum; obtain a bright smooth finish. Sand the area back to solid paint and feather the paint edge that leads to the exposed metal. Wipe the area clean and apply one coat of zinc chromate metal primer and two finish coats of paint to the metal surfaces.

4–3. VISUAL INSPECTION (EXTERNAL).

Inspect the unit for obvious defects, such as the following:

WARNING

Make certain that all power is removed and that high-voltage capacitors are discharged.

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a. Seating of all chassis and cable connectors.

b. High-voltage insulation sleeves for insulation damage.

c. High-voltage test leads for insulation damage.

d. Coaxil cable for insulation damage.

4-4. OPERATIONAL CHECKS.

a. Indications of Improper Operation of Multiplier.

(1) Any kind of electrical insulation breakdown or sparkover usually associated with noisy operation indicates improper operation of the Multiplier.

(2) The indicating instrument used in conjunction with the Multiplier, an oscilloscope or synchroscope, normally provides the best means of indicating improper operation of the Multiplier. No indication, intermittent indication, escessive size or distorted pattern on the scope is a good sign of a defective unit.

(3) It is very important to see that the indicating device itself is not defective and that the test setup is correct before concluding that the Multiplier is defective.

b. Corrective Measures. When the equipment fails to perform properly, turn off the power, discharge the high-voltage capacitors, and check for the conditions listed below. Do not check any item with the power on.

(1) Wrong input or output test cable connections.

(2) Disconnected or poorly connected test leads or coaxial cable.

(3) Broken clips, leads, or coaxial cable.

(4) Insulation cracks, or signs of serious deterioration.

(5) Incorrectly connected coaxial cable adapter to the indicating instrument.

(6) If the checks indicated in (1) through (5) above, do not locate the trouble. Troubleshooting is required by a higher echelon repairer.

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Section II. PREVENTIVE MAINTENANCE

4–5. SCOPE.

Preventive maintenance is the systematic care, servicing, and inspection of equipment to prevent occurrence of trouble, reduce down time and to maintain the equipment in an operable condition.

4–6. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS).

a. Table 4-1 contains PMCS for the TS-265A/UP and shall be performed periodically.

Table 4-1. Preventive Maintenance Checks and Services

ITEM TO BE INSPECTED	PROCEDURES CHECK
Multiplier TS-265A/UP	1. Visual inspection of chassis, conectors, cables, and insulation. (See para. 4-2 and 4-3.) 2. Operational checks (See para. 4-4.)
Adapter UG-1017/U	Visual inspection of connector and jacks.
Cord CG-107A/U	Visual inspection of connectors and insulation.
Test Leads	Visual inspection of connectors and insulation.
Case CY-1388/U	Visual inspection of latches, handle and hinges.

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CHAPTER 5

DIRECT AND GENERAL SUPPORT MAINTENANCE

Section I. TROUBLESHOOTING

5–1. TROUBLESHOOTING PHILOSOPHY.

To troubleshoot a defective voltage divider, the fault must first be localized. Localizing a fault means tracing the fault to the defective section that is responsible for the abnormal condition. Some faults, such as burned-out resistors and arcing, can be located by visual inspection, smell, and hearing. The majority of faults, however, must be localized by checking resistances and voltages. These checks are made by performing the following test procedures: short-circuits tests; voltage-dividing ratio tests; and voltage breakdown test.

WARNING

Before proceeding with any of the following tests or procedures, make certain that all power is removed and that high-voltage capacitors are discharged.

5–2. VISUAL INSPECTION (Interior).

a. Remove eight cover screws and separate the cover from the chassis to expose the parts.

b. Check wires for frayed insulation, excessive strain, twisting, or kinking.

c. Check for loose wires and cold solder connections.

d. Check resistors for indications of charring or cracking.

e. Check capacitors for fluid leakage.

f. If component cleaning is required use TRICHLOROTRIFLUOROETHANE.

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WARNING

Adequate ventilation should be provided while using TRICHLOROTRIFLUOROETHANE. Prolonged breathing of vapor should be avoided. The solvent should not be used near heat or open flame; the products of decomposition are toxic and irritating. Since TRICHLOROTRIFLUOROETHANE dissolves natural oils, prolonged contact with skin should be avoided. When necessary, use gloves which the solvent cannot penetrate. If the solvent is taken internally consult a physician immediately.

5–3. TEST EQUIPMENT REQUIRED.

All test equipment required for troubleshooting and performance verification is listed in Table 5-1.

Table 5-1. Equipment Required But Not Supplied

Quantity	Item	Application
1	Pulse Generator	Troubleshooting, maintenance, etc.
1	Oscilloscope, and 10x probe with voltage rating of 500 volts ac.	Troubleshooting, maintenance, etc.
1	Multimeter	Troubleshooting, maintenance, etc.
1	High Voltage Supply	Troubleshooting, maintenance, etc.

5–4. SHORT CIRCUIT TESTS.

The short circuit tests will enable determination of defective components and connections not visibly detectable. The tests are divided into two sections: the 100:1 section, and the 10:1 section.

WARNING

When servicing the Multiplier, by extremely careful of the high voltage. Before touching the Multiplier, always turn off power from equipment and discharge the high-voltage capacitors.

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NOTE

The voltage-dividing ratio tests (para. 5-5) and voltage breakdown test (para. 5-6) must be performed after repairs have been made.

a. Short Circuit Test; 100:1 Section.

(1) Test Preparations, 100:1 Section. Proceed as follows:

(a) Remove the Multiplier from the case.

(b) Insert the test lead (36-inch) into RATIO 100:1 input jack J103 (fig. 2-1).

(c) Insert the coaxial cable into Ratio 100:1 coaxial connector J101.

(d) Remove the eight chassis screws, four of which are located on the front panel and four on the top of the Multiplier.

(e) Separate the chassis to expose the parts.

(2) Section Resistance Measurements; 100:1 Section. The 100:1 section resistance measurements are made as indicated in table 5-2. Use the highest resistance range on the multimeter when checking the capacitors. Use the 0-100 OHM range on the multimeter when checking the resistors. When the faulty component is found, repair or replace component and recheck the resistance measurements before applying power to the unit. After making repairs or replacements, perform the voltage-dividing ratio tests (para. 5-5) and voltage breakdown test (para. 5-6).

b. Short Circuit Test; 10:1 Section.

(1) Test Preparations, 10:1 Section. Proceed as follows:

(a) Insert the test lead (18 in.) into RATIO 10:1 input jack J102.

(b) Insert the coaxial cable into RATIO 10:1 coaxial connector J100.

(2) Section Resistance Measurements; 10:1 Section. The 10:1 section resistance measurements are made as indicated in table 5-3. Use the highest resistance range on the multimeter (0-1000 MEG) when checking the capacitors. Use the 0-100 OHM range on the multimeter when checking the resistors. When the faulty component is found, repair or replace component and recheck the resistance measurements before applying power to the unit. After making repairs or replacements, perform the voltage-dividing ratio tests (para. 5-5) and voltage breakdown test (para. 5-6).

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Table 5-2. Short-Circuit Test for 100:1 Section

Point of measurement	Normal indication	Isolating procedure
Between the center conductor of the coaxial cable connector located on the far end of the cable and the junction point or R101 and C105 (fig. 5-1).	Approx 75 ohms.	Infinite resistance indicates open cable; defective receptacle, or open resistor R-101 (fig. 5-1). Check continuity of each item separately. Low or zero resistance indicates defective R101.
Between the outside conductor of the coaxial cable connector located on the far end of the cable and the ground lead clip (fig. 2-1).	Short.	Infinite resistance indicates open cable, loose connectors, broken ground lead, or loose receptacle J101 (fig. 5-1), or loose ground connection.
Between the junction point of R101, C105, and the ground lead clip (fig. 5-1).	Infinite resistance.	Short indicates defective C105 or C106 (fig. 5-1). Approximately 75 ohms indicates shorted coaxial cable or cable connectors. Check each item separately.
Between the high-voltage test lead (fig. 2-2) and and the junction point of C105 and R101 (fig. 5-1).	Infinite resistance.	Resistance reading indicates defective C104 (fig. 5-1).

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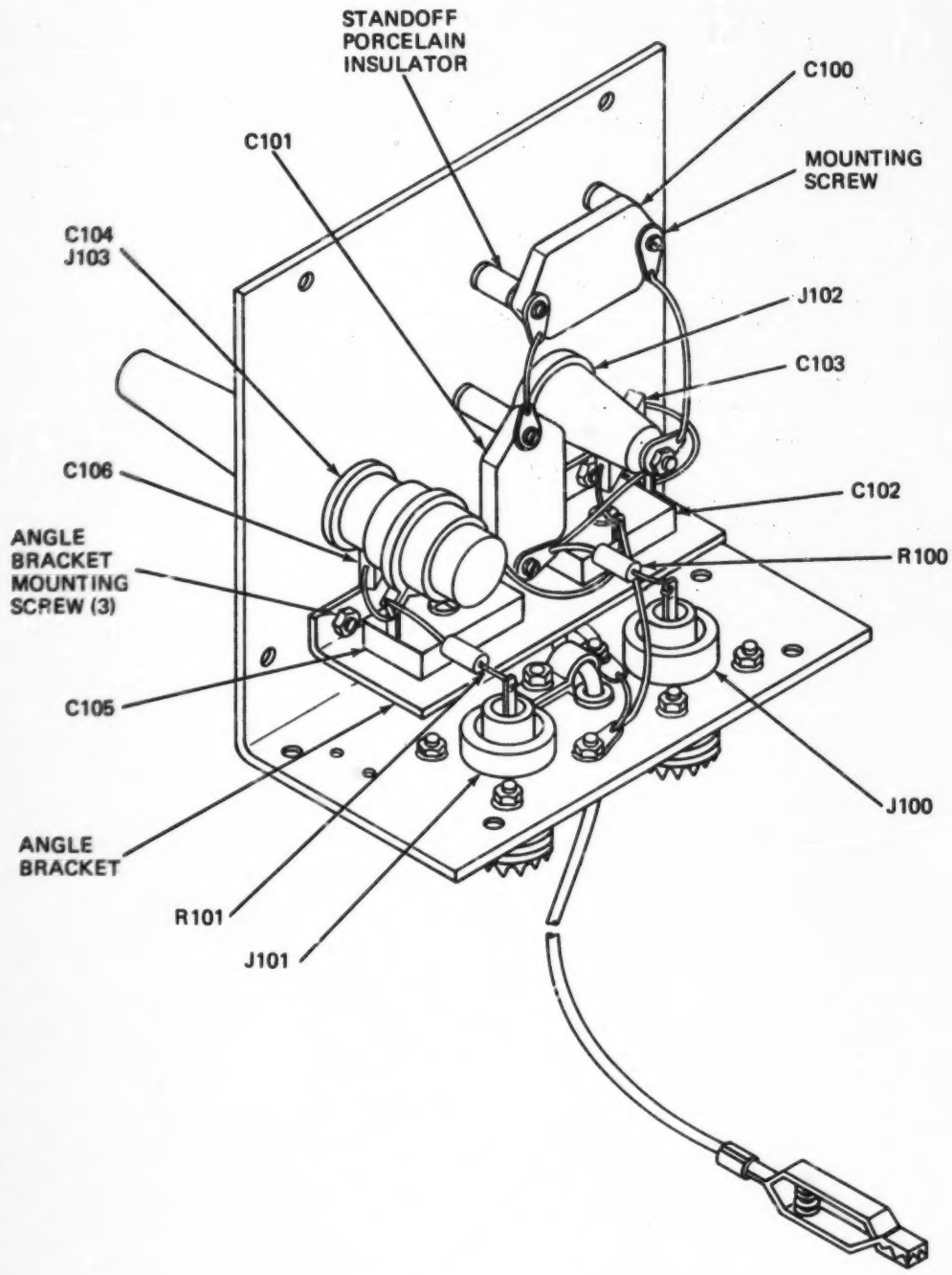

Figure 5-1. Multiplier, Electrical Instrument TS-265A/UP, Interior.

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Table 5-3. Short-Circuit Test for 10:1 Section

Point of measurement	Normal indication	Isolating procedure
Between the center conductor of the coaxial cable connector located on the far end of the cable and the junction point of the resistor R100 and capacitor C101 (fig. 5-1).	Approx 75 ohms.	Infinite resistance indicates open cable, defective cable connectors, defective receptacle, or open resistor R100 (fig. 5-1). Check continuity of each item separately. Low or zero resistance indicates defective R100.
Between the outer conductor of the coaxial cable connector located on the far end of the cable and the ground lead clip (fig. 2-1).	Short.	Infinite resistance indicates open cable, loose connectors, broken ground lead, or loose receptable J100 (fig. 5-1), or loose ground connection.
Between the junction point of resistor R100, capacitor C101 (fig. 5-1) and the ground lead clip.	Infinite resistance.	Short indicates defective C103 or C102 (fig. 5-1). Approximately 75 ohms indicates shorted coaxial cable or cable connectors. Check each item separately.
Between the high-voltage test lead (fig. 2-3) and the junction of C100 and C101 (fig. 5-1).	Infinite resistance.	Resistance reading indicates defective C100 (fig. 5-1).
Between the high-voltage test lead (fig. 2-3) and the ground lead clip.	Infinite resistance.	Resistance reading indicates defective J102 (fig. 5-1).
Between both ends of C101 (fig. 5-1).	Infinite resistance.	Resistance reading indicates defective C101 (fig. 5-1).

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5–5. VOLTAGE DIVIDING RATIO TESTS.

The voltage-dividing ratio tests will enable further determination of symptoms not visibly detectable. Utilize the troubleshooting chart (refer to subpara. b. below) after symptoms are known.

a. Voltage-Dividing Ratio Test Procedure.

WARNING

Before making any connections to the equipment, make certain that the power is off and that the high-voltage capacitors are discharged.

NOTE

This test must also be performed after repairs have been made.

(1) Connect the output of the pulse generator to the RATIO 100:1 input jack J103 (fig. 5-2), using the test lead (36-inch) and the ground lead that extends from the Multiplier.

(2) Set the pulse generator frequency to approximately 2.5 kHz.

(3) Connect the vertical terminals of the oxcilloscope across the outputs of the pulse generator (fig. 5-2).

(4) Connect the output coaxial cable into the RATIO 100:1 coaxial connector J101.

(5) Adjust the output of the square wave generator for 10-volt output; measure the output with the oscilloscope.

(6) Adjust the oscilloscope controls for steady and sharp display of the square wave on the oscilloscope screen.

(7) Remove the power from the pulse generator and from the oscilloscope.

(8) Disconnect the oscilloscope from the pulse generator and connect it to the output coaxial cable of the Multiplier (or to the adapter, if used) as shown with the dotted line in fig. 5-2.

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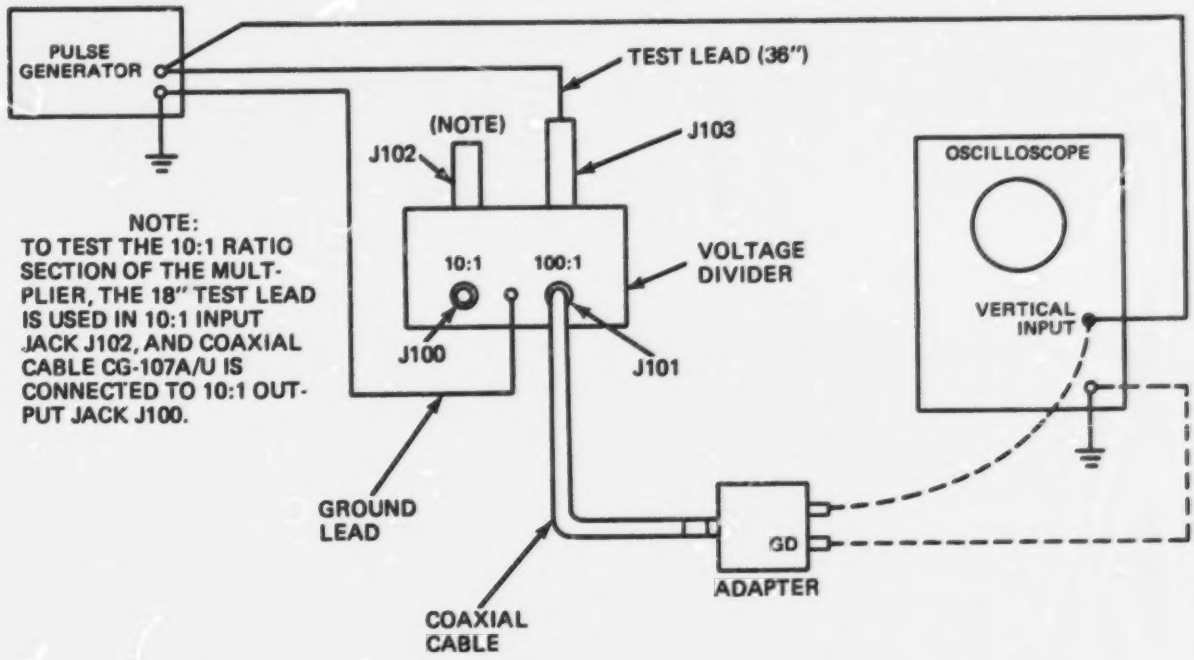

Figure 5-2. Voltage-Dividing Ratio Test Setup

(9) Apply power to both the pulse generator and the oscilloscope.

(10) Set the oscilloscope controls to calibrate and measure a voltage of one one-hundredth of the voltage that was obtained in step (5) above (0.1 volt).

(11) If the vertical amplitude of the leading edge of the tilted square wave pattern does not measure 0.1 volt ±5%, perform the adjustments outlined in steps (a) through (e) below.

(a) Remove the power from the pulse generator and from the oscilloscope.

(b) Loosen and take out the four mounting screws and remove the nameplate from the Multiplier.

(c) Apply power to both the pulse generator and the oscilloscope.

(d) Adjust trimmer capacitor C105 (fig. 5-1) of the voltage divider to obtain a vertical amplitude of 0.1 volt at the leading edge of the tilted square wave.

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(e) If the adjustment of trimmer capacitor C105 does not yield the required voltage (0.1 volt ±5%), refer to the troubleshooting chart (table 5-4).

(12) Repeat the procedures given in steps (1) through (9) above for the 10:1 voltage-dividing ratio section; use the RATIO 10:1 input jack J102 and the output RATIO 10:1 coaxial connector J100.

(13) Set the oscilloscope controls as necessary to calibrate and measure 1-volt input.

(14) If the vertical amplitude of the leading edge of the tilted square wave pattern does not measure 1 volt ±5%, complete the adjustments outlined in steps (a) and (b) below.

(a) Adjust trimmer capacitor C102 (fig. 5-1) of the voltage divider to obtain a vertical amplitude of 1 volt at the leading edge of the tilted square wave patterns.

(b) If the adjustment of trimmer capacitor C102 does not yield the required voltage (1 volt ±5%), refer to the troubleshooting chart (table 5-4).

NOTE

The voltage breakdown test (para. 5-6) must also be performed to ensure that the Multiplier will operate under high voltage.

b. Fault Location from Results of Voltage-Dividing Ratio Tests. Table 5-4 contains troubleshooting procedures for localizing faults in both the 100:1 and 10:1 ratio sections of the Multiplier, and for isolating problems to the component level. A schematic diagram of the Multiplier is shown in fig. 3-1.

CAUTION

If the operational symptoms are not known or if they indicate the possibility of short circuits within the voltage divider, be sure to do the short-circuit tests (para. 5-4) before applying any input to the unit.

NOTE

All checks outlined in the troubleshooting chart are to be conducted with the Multiplier connected for the voltage-dividing ratio tests (fig. 5-2).

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Table 5-4. Multiplier, Electrical Instrument TS-265A/UP, Troubleshooting Chart

Symptom	Probable cause	Procedure/Remedy
Output voltage across the output of the coaxial cable too low when 100:1 ratio is used.	Leaky or shorted capacitor C104, C105 or C106; or coaxial cable.	Check each component separately. Replace the defective item(s).
Output voltage across the output of the coaxial cable too high when 100:1 ratio is used.	C105 or C106 open, or C104 shorted or leaky.	Check each component separately. Replace the defective item(s).
Output voltage across the output of the coaxial cable too low when 10:1 ratio is used.	Leaky or shorted C103, C102, or coaxial cable. Open C100 or C101, or defective J102.	Check each component separately. Replace the defective item(s).
Output voltage across the output of the coaxial cable too high when 10:1 ratio is used.	C100 or C101 shorted; C103 or C102 open.	Check each component separately. Replace the defective item(s).

5-6. VOLTAGE BREAKDOWN TEST.

The following procedure provides instructions for a high-voltage breakdown test of Multiplier, Electrical Instrument TS-265A/UP.

WARNING

Before making any connections to the voltage divider, make sure that the power is off and high-voltage capacitors discharged.

WARNING

The ground lead should always be connected first, and output coaxial cable connected before applying high-voltage. When disconnecting, the high-voltage lead should always be disconnected first.

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a. Connect the ground lead of Multiplier (fig. 5-3) to the ground connection of the high-voltage supply.

b. Connect the test lead (18-inch) between the output of the high-voltage supply and the 100:1 input jack J103 of the Multiplier.

c. Turn on the high-voltage supply and gradually increase the output voltage to 50 kV as indicated on the meter scale of the high-voltage supply.

d. Maintain 50 kV across the input terminals for 1 minute. (There should be no evidence of insulation breakdown or sparkover as a result of this test.)

e. Discharge high-voltage capacitors.

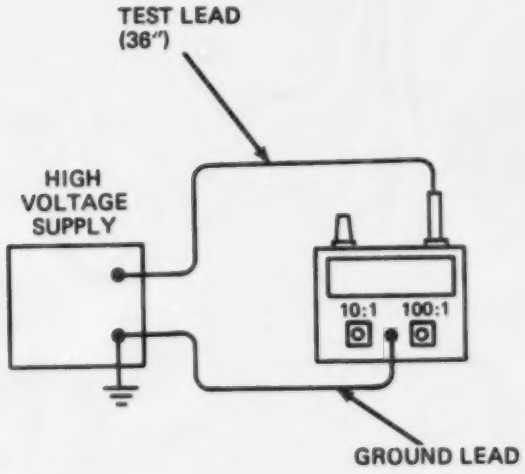

Figure 5-3. Voltage Breakdown Test Setup

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Section II. REPAIR

5-7. SCOPE OF REPAIR.

The unit does not have any repairable electrical parts. Cold solder connections or loose solder connections are resoldered as required, but all other defective parts shall be removed and replaced. Broken wires, wires with frayed insulation, and bent or defective connectors shall also be replaced.

WARNING

Before proceeding with any of the following procedures, make certain that all power is removed and that high-voltage capacitors are discharged.

NOTE

After removal and replacement of a defective component(s), the following tests must be performed: short-circuit tests (para. 5-4), voltage-dividing ratio test (para. 5-5) and voltage breakdown test (para. 5-6).

5-8. DISASSEMBLY.

To disassemble the Multiplier, Electrical Instrument TS-265A/UP, remove the eight cover screws and then separate the cover from the chassis to expose the parts.

5-9. REMOVAL AND REPLACEMENT OF HIGH-VOLTAGE CAPACITORS C100 AND C101.

To remove and replace high-voltage capacitors C100 or C101 (fig. 5-1), proceed as follows:

a. Removal.

(1) Remove the mounting screws from capacitor C100 or C101.

(2) Bend back the terminal and the bus wire.

(3) Lift the capacitor from the insulators.

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b. Replacement.

(1) Place capacitor C100 or C101 in position.

(2) Bend back the terminal and the bus wire in line with the mounting holes.

(3) Reinsert the two mounting screws.

5-10. REMOVAL AND REPLACEMENT OF STANDOFF PORCELAIN INSULATORS.

To remove and replace the standoff porcelain insulators (fig. 5-1), proceed as follows:

a. Removal.

NOTE

Capacitor C100 or C101 need not be removed or disconnected during removal of the insulators.

(1) Remove the insulator mounting screw of capacitor C100 or C101, as required, from the outside of the chassis.

(2) Remove the corresponding mounting screw from capacitor C100 or C101.

(3) Slip out the standoff insulator from between the chassis and the capacitor.

b. Replacement.

(1) Reinsert the new insulator between the chassis and the capacitor.

(2) Replace the mounting screws thru the chassis and capacitor.

5-11. REMOVAL AND REPLACEMENT OF TRIMMER CAPACITORS C102 AND C105.

To remove and replace trimmer capacitors C102 or C105 (fig. 5-1), proceed as follows:

a. Removal.

(1) With a soldering iron, disconnect all the terminal points for C102 and C105.

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(2) Remove the three angle bracket mounting screws from the outside of the chassis.

(3) Slide the angle bracket out the side, with trimmer capacitors C102 and C105 still in place on the bracket.

(4) Remove the damaged capacitor by removing the two mounting screws that hold the capacitor to the angle bracket.

b. Replacement.

(1) Replace the trimmer capacitor and reinsert the two mounting screws that hold the capacitor to the angle bracket.

(2) Slide the bracket back into place and replace the three angle bracket mounting screws.

(3) Resolder the terminal connections to the capacitors.

5–12. REMOVAL AND REPLACEMENT OF CONNECTORS J100 AND J101.

To remove and replace connectors J100 or J101 (fig. 5-1), proceed as follows:

a. Removal.

(1) Place soldering iron on terminal at the rear of the connector and remove resistor lead (R100 or R101).

(2) Remove the four mounting screws from the front of the chassis.

(3) Lift the defective connector out from the front.

b. Replacement.

(1) Install the new connector.

(2) Replace and tighten the four mounting screws.

(3) Insert the resistor lead (R100 or R101) into the terminal at the rear of the connector.

(4) Resolder the terminal; be careful not to burn the phenolic insulation part of the connector.

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5–13. REMOVAL AND REPLACEMENT OF CONNECTORS J102 AND J103.

To remove and replace connectors J102 or J103 (fig. 5-1), proceed as follows:

a. Removal.

(1) With a soldering iron on terminal at the rear of connector J103 remove resistor lead R101.

(2) Remove C100 terminal mounting nut at rear of connector J102.

(3) Remove mounting nut on outside of chassis for J102 or J103.

(4) Lift defective connector out from chassis.

b. Replacement.

(1) Place connector J102 or J103 in position and install mounting nut on outside of chassis.

(2) Replace C100 terminal and mounting nut at rear of J102 and tighten nut.

(3) Insert resistor lead R101 into terminal at rear of J103 and resolder.

5–14. REASSEMBLY.

To reassemble Multiplier, reattach cover to chassis and replace and tighten the eight cover screws.

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APPENDIX A

REFERENCES

A–1. SCOPE.

This appendix lists all forms, field manuals, technical manuals and misc. pubs. referenced in this manual.

A–2. FORMS.

Reporting of transportation discrepancies in shipment ..... AR 55-38
Reporting of item and packaging discrepancies ..... AR 735-11-2
Discrepancy in shipment report (DISREP) ..... SF 361
Report of discrepancy (ROD) ..... SF 364
Quality deficiency report ..... SF 368
Recommended changes to publications ..... DA Form 2028-2
Equipment inspection and maintenance worksheet ..... DA Form 2404
Consolidated index of DA publications and forms ..... DA Pam 310-1

A–3. FIELD MANUALS.

Packaging for limited storage or shipment, materials and procedures ..... SB 38-100
Field instructions for painting and preserving, electronic equipment ..... TB 746-10

A–4. TECHNICAL MANUALS.

Repair parts and special tools, TS-265A/UP ..... TM 11-6625-3042-24P
The Army maintenance management system (TAMMS) ..... DA Pam 738-750
Administrative storage procedures ..... TM 740-90-1
Destruction of Army electronics equipment ..... TM 750-244-2

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APPENDIX B

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

B–1. GENERAL.

This appendix provides a summary of the maintenance operations for TS-265A/UP. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

B–2. MAINTENANCE FUNCTION.

Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

b. Test. To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean, preserve, drain, paint, or to replenish fuel/lubricants/ hydraulic fluids or compressed air supplies.

d. Adjust. Maintain within prescribed limits by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

e. Align. To adjust specified variable elements of an item to about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipment used in precision measurement consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Install. The act of emplacing, seating, or fixing into position an item, part, module (component or assembly in a manner to allow the proper functioning of the equipment/system).

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h. Replace. The act of substituting a serviceable like-type part, subassembly, module (component or assembly) for an unserviceable counterpart.

i. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module/component/assembly, and item or system. This function does not include the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

j. Overhaul. That periodic maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (e.g., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like-new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc.) considered in classifying Army equipment/components.

Section II. COLUMN ENTRIES

B-3. COLUMN ENTRIES.

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies and modules with the next higher assembly.

b. Column 2, component/assembly. Column 2 contains the noun names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in column 2.

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a "worktime" figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate "worktime" figures will be shown

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for each category. The number of task-hours specified by the "worktime" figure represents the average time required to restore an item (assembly, subassembly, component, module, end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. Subcolumns of column 4 are as follows:

C - Operator/Crew
O - Organizational
F - Direct Support
H - General Support
D - Depot

e. Column 5, Tools and Equipment. Column 5 specifies by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

B-4. TOOL AND TEST EQUIPMENT REQUIREMENTS.

a. Tool and Test Equipment Reference Code. The numbers in this column coincides with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.

b. Maintenance Category. The codes in this column indicate the maintenance category allocated the tool or test equipment.

c. Nomenclature. This column lists the noun name and nomenclature of the tools and test equipment required to perform the maintenance functions.

d. National/NATO Stock Number. This column lists the National/NATO stock number of the specific tool or test equipment.

e. Tool Number. This column lists the manufacturer's part number of the tool followed by the Federal Supply Code for manufacturers (5 digit) in parenthesis.

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SECTION II MAINTENANCE ALLOCATION CHART
FOR
TS-265A/UP (6625-00-242-7544)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT	(6) REMARKS
			C	O	F	H	D		
	Multiplier Electrical	Inspect			0.1				1
		Service			0.2				2
		Test			0.1			1-5	3
		Inspect				0.2			4
		Test				0.2		1-5	3
		Repair				1.0		6	5
		Service				0.3			6

REMARKS

1. Visual inspection by user.
2. Clean and repaint chipped areas on exposed surfaces only.
3. Normal operational test.
4. Visual inspection of both internal and external areas.
5. Repair of complete item by replacement of all electronics components and mechanical parts.
6. Clean and repaint chipped areas on both exposed and non-exposed surfaces.

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SECTION III TOOL AND TEST EQUIPMENT REQUIREMENTS FOR TS-265A/UP (6625-00-242-7544)

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL NATO STOCK NUMBER	TOOL NUMBER
1	H,D	Electronic Counter AN/USM-459	6625-01-061-8928	
2	H,D	Generator Function SG-1133/U or SG-1171/U	6625-01-028-4989	
3	H,D	Multimeter AN/USM-223 or AN/PSM-45	6625-00-999-7465	
4	H,D	Oscilloscope AN/USM-281	6625-00-106-9622	
5	H,D	Test Set Insulation Breakdown AN/GSM-6	6625-00-542-1331	
6	H,D	Tool Kit TK-101/G	5180-00-064-5178	

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RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)
Commander
Stateside Army Depot
ATTN: AMSTA-US
Stateside, N.J. 07703

DATE SENT
10 July 1975

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 11-5840-340-12	23 Jan 74	Radar Set AN/PRC-76

BE EXACT. PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
2-25	2-28			Recommend that the installation antenna alignment procedure be changed throughout to specify a 2° IFF antenna lag rather than 1°. REASON: Experience has shown that with only a 1° lag, the antenna servo system is too sensitive to wind gusting in excess of 25 knots, and has a tendency to rapidly accelerate and decelerate as it hunts, causing strain to the drive train. Hunting is minimized by adjusting the lag to 2° without degradation of operation.
3-10	3-3		3-1	Item 5, Function column. Change "2 db" to "3db." REASON: The adjustment procedure for the TRANS POWER FAULT indicator calls for a 3 db (500 watts) adjustment to light the TRANS POWER FAULT indicator.
5-6	5-8			Add new step f.1 to read, "Replace cover plate removed in step e.1, above." REASON: To replace the cover plate.
		F03		Zone C 3. On J1-2, change "+24 VDC to "+5 VDC." REASON: This is the output line of the 5 VDC power supply. +24 VDC is the input voltage.

SAMPLE

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER	SIGN HERE
SSG I. M. DeSpiritof 999-1776	SSG I. M. DeSpiritof

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DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 11-6625-3042-14	6 Sept 1985	Operator's, Org, DS & GS Maint Manual Multiplier TS-265A/UP

BE EXACT PIN-POINT WHERE IT IS				IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.	

PRINTED NAME GRADE OR TITLE AND TELEPHONE NUMBER

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